

Global lightning distribution with information of charge moment change

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Lightning is an electrostatic discharge phenomenon in the atmosphere. Primarily there are three types of discharges, namely, cloud-to-cloud discharge (CC), intra-cloud discharge (IC), and cloud-to-ground discharge (CG). Further, CGs are classified into two types: positive and negative polarities. Charge moment change (Qdl) is one of the parameters representing the significance of lightning discharge. In this study, base on the analysis of lightning waveform observed by global ELF observation network (GEON) we constructed an empirical model of the Qdl distribution, by fitting simple curves to the observational datasets for almost all the Qdl range, that is, from 0 to 3000 C-km. We examined the characteristics of the Qdl distribution in 7 regions where lightning activity is quite high, namely, Maritime Continent in Asia, Australia, Central Africa, South Africa, North America, South America, and South Pacific. The results show a large variation of the distribution depending on the location, season and current polarity. This empirical model of the Qdl distribution can be applied to various purposes, such as an estimation of global circuit current and comparison with meteorological parameters.

Keywords: lightning, charge moment change, global distribution, empirical model